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STUDY OF THE THERMAL REGIME OF 2005-2006 WINTER ON THE TERRITORY OF THE REPUBLIC OF MOLDAVIA AND ITS IMPACT ON THE ENVIRONMENT

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Key words: winter, cold wave, Republic of Moldavia.

Résumé. Les analyses sur les valeurs thermales ont été mises en places tenant compte de la base de données prises de 6 stations d`analyse des eaux du territoire de Bessarabie ( Cahul, Comrat, Chisinau, Cornesti, Balti, Briceni). Fonction des multiples aspects de la température de l`air de 2005-2006 pendant l`hiver, on a mis en analyse les suivantes caractéristiques climatiques : la moyenne journalière de la température, la température moyenne hebdomadaire, les minimas absolues de la température.

Introduction.

The research of the special phenomena that occur in nature, represents a permanent subject of interest for scientists.

The knowledge of the complexity of the conditions, and mainly the establishing of the standard parameters within which the rare phenomena and critical situations in nature occurred, the extreme limits of the meteorological phenomena etc, are quite difficult issues.

The special situations that occur in nature have always created difficulties in the normal development of many activities, and therefore, scientists in different fields are preoccupied with the analysis, study and knowledge of the causes that generated those situations.

Climatologists have had their own significant contribution to the explanation of the aspects related to these phenomena.[1].

The climatologists have continued the research of the unusual natural phenomena, paying special attention to the study of the rare or unique monthly, seasonal and annual values of air temperature or other meteorological elements. This is why, in the present study we want to present the results of the research on the evolution of the thermal regime during 2005-2006 winter, which was one of the coldest in the last 20 years.

The analysis of the thermal values has been made on the basis of the data collected from 6 representative weather stations within the Republic of Moldavia (Cahul, Comrat, Chişinău, Corneşti, Bălți, Briceni).

In order to point out the multiple aspects of air temperature in 2005-2006 winter, we have analysed the following climatic characteristics: average daily temperatures, average monthly temperature, absolute minimum temperature.

2.Average daily and monthly temperature. For the first month of 2005-2006 winter, that is December, the daily averages varied from 9.3ºC to -5.2ºC in the southern part of the country (Cahul station) and from 7.6ºC to -7.4ºC in the northern part of the country (Briceno station), and therefore, we can state that the month of December 2005 was a relatively warm month. The monthly average remained positive – Cahul 1.7ºC, Chişinău 1.5ºC; only in the extreme north these values were negative – 0.1ºC (in Briceni). For comparison, we propose a table with the multi-annual thermal averages (December) and thermal averages of the month of December 2005.

Table.1. *Multi-annual average temperature (December) and the average temperature of December 2005 [2].*

Station	Briceni	Bălți	Cornești	Chișinău	Comrat	Cahul
Multi-annual average	-2.1	-1.9	-0.9	-0.8	-0.6	-0.5
Average temperature of December 2005	-0.1	1.1	0.7	1.5	1.5	1.7

The situation was different for the month of January 2006, when temperatures were very low. The daily temperatures oscillated a lot, from la 5.9ºC to -20,2ºC in the south of the republic (Cahul) and from 1.9ºC to -23.9ºC in the north (Briceni). The average monthly temperature for the month of January 2006 recorded significant negative deviations, from 2.7ºC in the south, to approximately 3.0ºC in the north, as compared to the multi-annual average temperature. The table below will present even more convincing data to demonstrate that.

Table.2. *Multi-annual average temperature (January) and average temperature of January 2006 [2].*

Station	Briceni	Bălti	Cornești	Chișinău	Comrat	Cahul
Multi-annual average temperature	-5.3	-4.4	-4.0	-3.5	-2.8	-2.7
Average temperature of January 2006	-8.1	-7.3	-7.4	-6.6	-6.1	-5.4

The lowest daily average temperatures for other stations on the Republic of Moldavia were: -21.4ºC (Comrat); -22.6ºC (Cornești); -22.0ºC (Bălți), and all were recorded on 23rd January, 2006.

Of the 31 days of the month of January, the average daily temperatures were negative in 27 days in Cahul, 29 in Chișinău and 30 in Briceni. This fact caused the maintenance of a quite cold air on the duration of the whole month, especially in the 3rd decade (the period 22nd-23rd January2006).

The cause of these unusual low temperatures was the intense activity of the Scandinavian Anticyclone and of the Eastern European (Siberian) Anticyclone, that pumped arctic cold air, with temperatures below -20ºC over the whole European territory, as far as to the Balkan Peninsula, including the Republic of Moldavia (fig.1).

In correlation with the persistent activity of the Mediterranean cyclones in the south-east of Europe and over the Black Sea, characterized by hot and humid air, abundant snowfall occurred. In many places a thick layer of snow was deposited (40-50 cm).

By effective radiation, the adjacent strata of air cooled. Due to this fact, for 7 days in a row the average air temperature dropped below -10.0ºC (or even below -15.0ºC locally) in the north (tab.3).

Analyzing the data presented in table 3, we conclude that the lowest daily average temperatures, as well as the lowest average temperature for the period 20-28th January 2006, were recorded in Bălți (not in the northern extremity - Briceni), because in the case of Bălți a genetic factor of massive cooling is represented by the depression landforms of the Northern Moldavian Plain (Hilly Steppe Plain of Bălți), where the persistence of the air and its cooling generate an immense „lake of cold air" (Fig.1). In the south of the republic the cooling of the air is not so significant (Comrat, Cahul).

Figure .1 Synoptic situation on 23rd iJanuary-2006

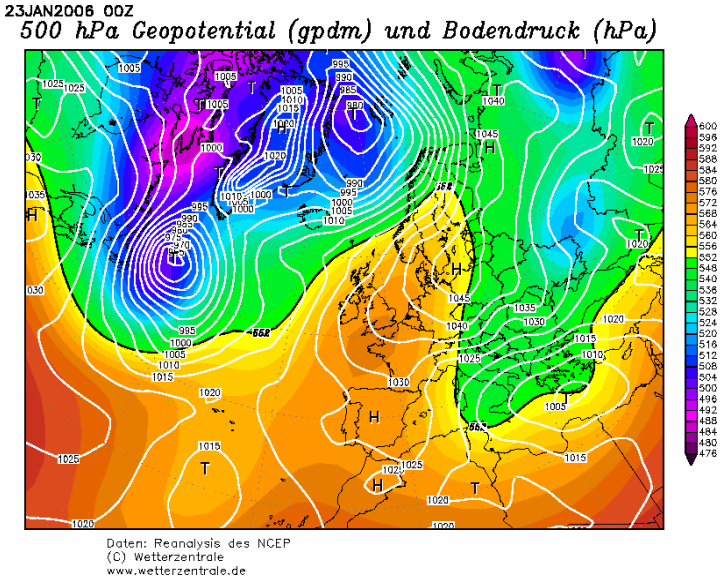
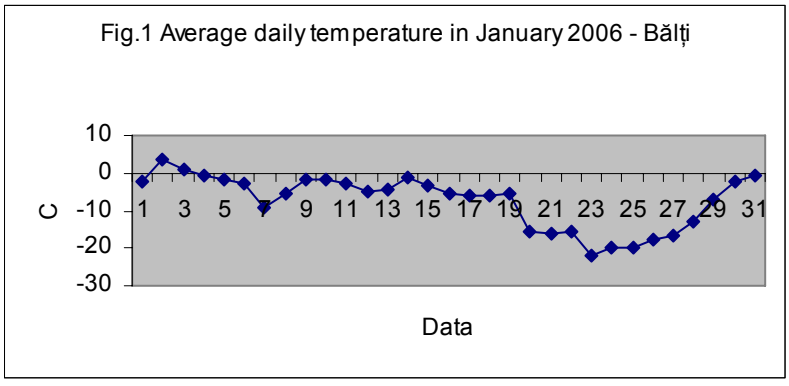


Table.3. *Average daily air temperature in the period 20-28th January 2006.*

Date/Station	20	21	22	23	24	25	26	27	28	Average
1.Briceni	-17.5	-17.1	-17.2	-23.9	-21.0	-17.8	-14.2	-12.8	-10.2	-16.8
2.Bălți	-15.6	-16.0	-15.8	-22.0	-19.7	-19.6	-17.9	-16.5	-12.7	-17.3
3.Cornești	-16.3	-16.1	-16.1	-22.6	-20.8	-15.4	-12.7	-9.6	-8.1	-15.3
4.Chișinău	-15.1	-15.8	-16.3	-21.4	-18.6	-15.0	-12.6	-10.7	-7.0	-14.7
5.Comrat	-13.5	-13.8	-14.1	-21.4	-18.9	-15.5	-12.4	-9.9	-8.5	-14.2
6.Cahul	-11.4	-11.5	-10.6	-20.2	-18.3	-16.2	-13.7	-8.6	-7.3	-13.0



The average daily temperature in the month of *February 2006* oscillated between 7.7ºC and -11.6ºC in Cahul and between 3.3ºC up to -13.1ºC in Briceni. The average monthly temperature was -1.3ºC in Cahul and -4.8ºC in Briceni. The thermal deviations from the multi-annual average were low, and therefore we can state that the month of February 2006 was normal from a thermal point of view. The coldest air wave was present on 6-7th February, when average daily temperatures of -11.6 ºC (on 6th February) and -10.8ºC (on 7th February) were recorded in Cahul. In Ripiceni, in the north, the temperatures recorded were: -15.3ºC (06.02.2006) and -13.4ºC (07.02.2006). Positive average diurnal values in the month of February were mainly recorded in the third decade.

2.Absolute minimum temperature – As compared to the average daily and monthly temperatures, the absolute minimum temperatures are much lower (table 4).

Table.4. ***Absolute minimum temperatures (ºC) in the 2005-2006 winter on the territory of the Republic of Moldavia.***

Month / Station	December (date)	January (date)	February(date)
1.Briceni	-10.2 (22)	-28.0 (23)	-19.6 (06)
2.Bălţi	-9.5 (22)	-26.0 (25)	-21.1 (06)
3.Cornești	-9.2 (22)	-25.3 (23)	-18.3 (06)
4. Chişinău	-8.6 (23)	-24.2 (23)	-16.9 (07)
5.Comrat	-9.7 (24)	-24.6 (23)	-17.0 (07)
6.Cahul	-8.9 (24)	-22.7 (23)	-16.0 (07)

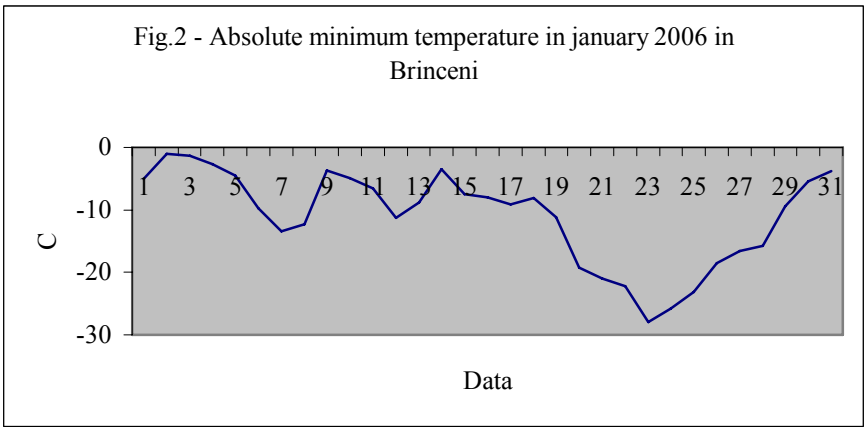


Fig.2 - Absolute minimum temperature in january 2006 in Brinceni

We can notice that the absolute minimum temperature in the whole winter of 2006 was recorded on the 23rd January, and it was -28.0ºC in Briceni, in the north of the country (Fig.2). The secondary absolute minimum had a value of -26.0ºC and it was recorded on the 25th January in Bălţi that is after two days, when the depression landforms here determined the excessive cooling of air.

By comparing the average minimum temperature with the absolute minimum temperature we can notice significant deviations. For example, in Briceni, the average minimum of the month of December had a value of -4.7ºC, and the absolute minimum reached -10.2ºC; in January, for the same station, the average minimum temperature was -8.4ºC, and the absolute minimum temperature was -28.0ºC.

1.Risk aspects. As shown previously, the great cooling in January 2006 was caused by two factors: very low temperatures and the thickness of snow cover. As a consequence, the risk was favoured by the association between the negative temperatures with the freezing effect, and the great humidity caused by the snow cover.

As a result, in the Republic of Moldavia 37 people died because of the cold, and on the whole country, approximately 538 people were hospitalized with the diagnosis of hypothermia [3]. In 15 departments in the northern part of the republic classes were suspended in most of the schools and kindergartens. In Şoldăneşti Department, the didactic process was stopped in 18 schools, Râşcani – 17 schools, Criuleni – 9, Ialoveni – 6, Chişinău – 26. The Administration of the Republican Clinic Hospital even suspended all the planned surgeries because of the cold. According to the Press Service of the Department for Exceptional Situations, traffic was very difficult on the roads next to the following towns: Căuşeni, Hânceşti, Otaci, Lipcani and Ungheni.

The same picture was present in other European states as well: Poland – 39 dead people because of the cold, Russia – 84, Romania – 22, etc. Milan, between 20th-21stJanuary, was „paralysed" because of the massive snowfall, and in Switzerland and France „Orange" alert state was decreed, Frankfurt airport cancelled about 20 flights also because of the cold and the snow cover [4].

As a conclusion, we can appreciate that the massive cooling if air in January 2006 caused low values of temperature on extended spaces. These values are included in the negative thermal singularities, as an expression of the cold waves produced by the continental anticyclones pumping extremely cold polar air, and especially arctic air, over the territory of the Republic of Moldavia. The negative impact on agriculture was represented by the fact that many multi-annual crops (peaches, vine) got frozen, and the beginning of the summer agricultural works delays with 2-3 weeks. All these phenomena of nature, with their

consequences, could make us actively and thoroughly prepare for the inevitable cold season in the future.

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